Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Journal of the Society of Arts.

FRIDAY, OCTOBER 3, 1862.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of the present month, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have determined to issue to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now about to be issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on Wednesday evening next, the 8th of October. The cards of invitation have been issued.

INTERNATIONAL EXHIBITION OF 1862.—Visits of Schools.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from 22nd to the 27th September, 1862:—

Date.	From what Locality.	Name of School.	By whom Sent.	No. of Children from each School.	Total each day.
Sept. 22	Aylesbury...	National	Duke of Buckingham ...	28	90
„ „	Northfleet...	National	Mr. Bevan...	11	
„ „	Derby	Wesleyan Sunday	Mrs. C. H. Turner	45	
„ „	Wandsworth	Patriotic Fund (Pupil Teachers) ...	Lord Colchester	6	
„ 23	Baldock, Herts	Sunday	G. Johnston, Esq.	38	298
„ „	St. Peter's, Pimlico ...	National	Rev. Thos. Fuller	52	
„ „	Royston (Herts) ...	National	Subscription	59	
„ „	New Cross	Royal Naval	The Council	68	
„ „	Crayford (Kent).. ...	National	C. Swaisland, Esq.	57	
„ „	Bedford	Sir Wm. Harper's	John Howard, Esq. (Mayor)	15	
„ „	Baldwin's-gardens ...	St. Alban's Church Choir	Rev. A. H. McKonochie...	9	
„ 24	Winkfield, Berks ...	Free	Subscription	22	337
„ „	Blandford-square ...	St. Edward's	Rev. E. Stoner	38	
„ „	Blandford-square ...	Convent...	Sisters of Mercy	42	
„ „	Chiddington, Kent ...	Adult Night	Rector and Squires	62	
„ „	Coventry	Baylies Charity	The Trustees	20	
„ „	Rotherhithe	National	Sir Wm. and Lady Gomm	86	
„ „	City of London... ...	Aldersgate Ward	Rev. W. C. F. Webber ...	20	
„ „	Watford (Herts) ...	British	Subscription	47	
„ 25	Finchley	National	Rev. S. R. White	31	
„ „	South End, Lewisham	National	Rev. S. E. F. Forster ...	24	
„ „	St. Saviour's, Chelsea	National	Mr. and Mrs. McGarel ...	60	
„ „	St. Peter's, Pimlico ...	National	Rev. Thos. Fuller	52	
„ „	Paddington-green ...	Paddington	Subscription	13	
„ „	Cambridge-heath ...	Hebrew	Committee..	60	
„ „	Doctors'-commons ...	3rd City of London National... ...	Dr. Kynaston	16	
„ „	Tulse-hill (Surrey) ...	Grenada House...	E. R. Sheen, Esq.	16	

RETURN OF SCHOOLS (*Continued*).

Date.	From what Locality.	Name of School.	By whom Sent.	No. of Children from each School.	Total each day.
„ „	Herts	Totteridge park	R. Wilkinson, Esq.	25	
„ „	Farringdon-street	British	Subscription	10	
„ „	Bristol	Colston's Hospital	The Trustees	126	433
„ 26	Chichester	Teachers, Pupil Teachers.	Lord H. Lennox	39	39
„ 27	St. Giles-in-the-Fields	Teachers from National	Rev. A. W. Thorold.	12	12

Visits of Workmen.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 22nd to 26th September, 1862 :—

Date.	Description of Persons.	From what Locality.	By whom Sent.	Number.
Sept. 22	Farm Labourers	Burton-on-Wolds, Leicestershire	Edward Hallam, Esq.	24
„ „	Mechanics and Labourers	Cookham Dean, Berks	Rev. Geo. Hodson	28
„ „	17th Royal Engineers	Dover	The Officers	17
„ „	Envelope Manufacturers	Upper Thames-street	Dudley Rolls and Co.	260
„ „	Farm Labourers	Guildford	Messrs. Piccards and Lea	48
„ „	7th Beds. Volr. Band	Biggleswade	Subscription	12
„ „	Printers	"Gresham Steam Press" Bucklersbury	Mr. C. Unwin	79
„ 23	Garden Labourers	Redleaf, Penshurst	A. Glendening, Esq.	15
„ „	Farm Labourers	Finedon, Northamptonshire	J. W. Smith, Esq.	25
„ „	Farm Labourers	Finedon, Northamptonshire	W. Walker, Esq.	10
„ „	Farm Labourers	Finedon, Northamptonshire	R. P. Wakefield, Esq.	15
„ „	Agricultural Labourers	Lyne House, Horsham	Rev. J. Broadwood	30
„ „	Agricultural Labourers	Slinfold, Sussex	Thomas Child, Esq.	22
„ „	Agricultural Labourers	Wickham, Kent	Chas. Collard, Esq.	26
„ „	"H" Division of Police	Hull	Subscription	20
„ „	Agricultural Labourers	Hendbourne, Hants	Mrs. Courtney	40
„ „	Timber and Slate Workers	Littlehampton, Sussex	J. E. Butt, Esq.	33
„ „	Agricultural Labourers	Grafton Manor, Worcester.	Thos. Parks & H. Whitehare, Esqs.	20
„ „	Agricultural Labourers	Badsey, Evesham	Rev. S. Yorke	26
„ „	Agricultural Labourers	Boxgrove, Chichester	H. Freeland, Esq.	10
„ „	Agricultural Labourers	Boxgrove, Chichester	Subscription	11
„ „	Shoe-blacks	South London	T. G. Payne, Esq.	13
„ „	Farm Labourers	Itchen Abbas	Lord and Lady Ashburton	50
„ 24	Farm Labourers	Isham, Notts	Mr. Thos. Dicks	17
„ „	Farm Labourers	Pitchley Grange Farm, Notts	Mr. Ed. Dunkley	16
„ „	Farm Labourers	Great Harrowden, Notts	Mr. John Saunders	9
„ „	Band of the 8th Dorset R. Volunteers	Blandford, Dorset	Mr. Applin, Drum-Major	17
„ „	Farm Labourers	Twyford, Winchester	Subscription	160
„ „	Agricultural Labourers	Barking Creek, Essex	J. B. Lawes, Esq.	21
„ „	Agricultural Labourers	Smeeton, Leicestershire	W. Paberdy, Esq.	15
„ „	Agricultural Labourers	Itchen Stoke, Hants	Lord Ashburton & Rev. C. R. Conybeare	60
„ „	Agricultural Labourers	Basingstoke	R. Awbery, Esq.	22
„ „	Brewers	Walshan Le Willows, Suffolk	J. Miller, Esq.	16
„ 25	Artisans and Operatives	Bristol	Individual Subscription	400
„ „	Mechanics and Labourers	Eridge Castle, Tonbridge Wells	Earl of Abergavenny	110
„ „	Band of 4th Surry Rifles.	Surrey	Rev. W. A. Bowyer	25
„ „	Agricultural Labourers	Suffolk	J. Goodchild, Esq.	50
„ „	Inmates of the London Master Bakers Alms Houses	Lea Bridge-road, Essex	J. Death, Esq. and Friends	27
„ 26	Mechanics and Labourers	Sugar Refining Works, Bristol	Finzel Son, and Company	660
„ „	Mechanics and Labourers	King-street Hall Cooperage, Bristol	Messrs. Ford and Canning	140
„ „	Labourers	Chenies, Bucks	Rev. Lord Wm. Russell	22

THE MINERAL FUEL OF ITALY.

By W. P. Jervis, Mining Engineer, Assistant-General to the Italian Special Commissioners at the International Exhibition of 1862.

Italy, possessing as she does such vast mineral resources, it becomes an object of great importance to know whether it is desirable to smelt the ores at home or sell them to foreign capitalists. The answer to this question, which holds good for iron-works and manufactories in general, must depend upon the quantity of fuel to be obtained in Italy and neighbouring countries. Could we say positively that there were extensive deposits of coal, as in England, France, Belgium, or Prussia, it would be easy to decide upon the establishment of large works in convenient situations, and to give the necessary impulse to metallurgical operations.

As regards the use of charcoal in smelting-works, it seems to me that it would be very unwise to manufacture it on a large scale, which would involve the cutting down of the forests; the more so, since the mountainous region of Italy is so subject to violent rains, that wherever the country is stripped of trees all the soil is washed away, rendering the place quite useless for agricultural purposes, and mountain torrents are formed which swell almost instantaneously, carrying away bridges, and devastating the fertile fields towards the plains. Such is the injurious effect of cutting down all the trees that in such cases the slopes of the soft *macigno* sandstone hills become furrowed by an infinity of little watercourses, forming deep ravines with steep sides, which rapidly enlarge every winter, until at length they often attain a depth of 100 feet. The lower ground at the same time becomes exposed to the severe winter winds, the force of which is no longer broken by the shelter afforded by trees planted on the summits of the hills.

Unfortunately, it must be confessed that Italy does not possess any true coal except in the Alps and the Island of Sardinia, and even there only in very insignificant quantities. Professor Meneghini has, indeed, made the important discovery of the presence of the Coal formation in Tuscany, and given an interesting list of the fossil plants, but to the manufacturer this is of no value, for on visiting Jano (*Pisa*), the site of his investigations, I was unable to procure more than a few individual specimens of plants, almost converted into anthracite by the metamorphic agency of the neighbouring serpentine eruptions.

Tertiary lignite, on the other hand, occurs in numerous places in Italy, and is often of the best quality to be found in the world; but the basins in which it is found are very small and insignificant, so that in the course of 20 or 30 years of active working the largest of them might be worked out. This is no reason why these deposits should not be turned to account at once, and become the source of industrial speculation—on the contrary, at a future period there will be greater facilities for obtaining coal from Heraclea and other places in Asia Minor, as well as from several countries bordering on the Mediterranean, to which Italy must eventually have recourse for her fuel.

The best lignite in Central Italy is that of Montebamboli (*Grosseto*), 13 miles from the coast, and about 65 S. of Leghorn. This mine was opened in 1839, and has been rather extensively worked for many years. It furnishes black lignite of so bituminous a nature as to be difficult to distinguish from Newcastle coal, to which Prof. Cocchi considers it equal, the more so as it produces excellent coke and abundance of gaseous matter, so that it is suited for a variety of purposes, such as for metallurgical and gas works, and for steam vessels. The French Government have specified it among the varieties of coal allowed to be purchased for the Imperial Navy, and it has been employed for some years at the arsenal of Genoa, which speaks well for its calorific power and purity. M. Ponsard has within the last two years made use of this lignite with success for his new puddling furnaces at the iron works at Follonica (*Grosseto*), in the manufacture of rails, &c., but the sulphur it contains renders it unfit it for smelting the iron ore.

The basin of Monteamboli is about 3 miles in circuit, and contains two beds, one of 4 feet, below which is another of 2 feet, resting on *Alberese* breccia. They are separated by 3 ft. 4 in. of limestone containing *Dreissena Brardi*. These strata vary in inclination from 0° to 60°; they belong to the Miocene formation, as is seen by the fossil remains, such as exogenous plants, and the presence in the shales of the teeth and jaws of *Anthracotherium*, and the carapaces of tortoises.

The bituminous character of the lignite and its great similarity to coal, result from the intrusion of the serpentine or other eruptive rocks in immediate contact, so that the mineralisation of the woody matter which, under ordinary circumstances, requires a far longer period to bring about, and is only complete in the Palæozoic coal measures, has been here produced in the middle Tertiary beds. This perfect mineralisation is unfortunately accompanied by a great disadvantage, the strata being so broken with faults that it is difficult to work the lignite. A railway has been made to convey the lignite to the coast at Torre.

Not many miles south of Massa Marittima is the lignite basin of Monte Massi and Tatti (*Grosseto*), in Val di Bruno, where a shaft has lately been sunk. The section of the strata in the shaft is:—

Clay	63 feet.
Lignite	11 „
Clay	30 „
Good Lignite	3 „

In some parts there are three beds, of which one is upper Tertiary, the other two lower Tertiary. The strata are less broken here than at Montebamboli, but the lignite, although perfectly adapted for glass works, brick works, steam-engines, &c., is less bituminous.

The mine of Sarzanello is situated on the confines of the province of Genoa and of the former kingdom of Sardinia. It has been worked with considerable activity for several years, as the lignite has been employed at the lead works of Pertusola, on the gulf of Spezia, and also for the steam vessels of the Sardinian Navy. Now that a large arsenal is required at the port of La Spezia, as well as a coaling depôt for steam vessels of the royal and mercantile navies, it is very convenient to possess such excellent lignite so near. There are two beds, the first of 7 inches thick, followed by 6 feet of highly bituminous schists, which undergo spontaneous combustion on exposure to the air, then 6½ feet of good black, resinous-looking lignite.

The first researches were made at Caniparola (*Massa and Carrara*) in 1824, and two years later by Signor Schneider, of Monte Catini; the mine was shortly afterwards abandoned to be only resumed in 1857, the present engineer being M. Pirchker.

Prof. Cappelini gave the following section of the strata at Caniparola, in the *Memorie della reale Accademia delle Scienze di Torino*:—

	Feet.	in.
Coarse conglomerate	60	0
Numerous thin alternating beds of clay and conglomerate	262	0
Coarse conglomerate	33	0
Clay, sand, and schistose clay	8	0
Conglomerate	26	0
Clay and *Mollasse*, with vegetable remains	157	0
Dark clay, containing fragments of shells and *Chara Escheri*	0	8
Ash-grey clay	0	4
Blackish argillaceous schists, containing beds of lignite only a few inches thick, except one of 1 mètre (3ft. 4 in.), and another of 30 centim. (16 in.), separated from each other by a thin stratum of schist, so that both are worked together	20	0
Total	567	0

—(*Serie* II., tom. XIX.)

These strata dip at an angle of 60°, and rest on *Alberese* limestone.

The fossil flora of these beds at Caniparola and Sarzanello is given by Capellini as follows:—

In the clay:—*Juglans acuminata, Chara Escheri, Phyllites Sarzanellanus, Sapocites minor.*

In the *Mollasse*:—*Quercus Charpentieri, Fagus attenuatus, Berchemia multinervis, Betula denticulata, Andromeda protogœa, Rhamnus ducalis, Celastrus Capellinii, Cinnamomum Scheuchzeri.*

In both clay and *Mollasse*:—*Sequiva Langsdorfi, Platanus aceroides, Populus leucophylla, Carpinus pyramidalis, Laurus princeps, Oreodaphne Heerii, Hedera Strozzii, Pterocarya Massalongi, Glyptostrobus europœus, Planera Ungheri.*

The most important lignite mine in Piedmont is that of Cadi-Bona, seven miles north of Savona (*Genoa*), discovered in 1786, and belonging to Marquis Pallavicini. There is only one bed, varying in thickness from 1·50 mètres (4½ feet), to 4·10 mètres (13½ feet), the average being 2·20 mètres (7 feet), with an inclination of 8° or 10° to the north.

1 kilo. produces, by distillation, 220 litres of gas.
„ „ 0·64 kil. of coke.
„ „ 0·65 kil. of tar.
„ „ 0·035 kil. of ammoniacal water.

Completely dried it loses 17 per cent. of its weight.

The price on the spot is 15·50 *lire* (12s. 6d.) per ton for the large lumps, and 4·50 *lire* (3s. 7d.) for the small coal.

The new mine of Podernuovo, in Val di Cecina (*Pisa*), is worked on two beds of lignite 1·20 *mètres* (4 feet) in thickness, dipping at an angle of 4° and separated by 1 foot of argillaceous marl, containing *Planorbis, Paludina* and other fresh-water shells; the same clay occurs under the lower bed of lignite.

Marquis Ginori-Lisci has commenced working a mine at Querceto, near Podernuovo (*Pisa*), whence he obtains perfectly black lignite, in which the woody texture has not been destroyed; but the calorific power is far inferior to that of Montebamboli or Tatti. This lignite produces, when struck, the peculiar sound given by charcoal, which it resembles very closely.

An infinity of small lignite basins exist on the east of the Appennines, as in the Provinces of Parma, Modena, Macerata, Forlì, Ravenna, &c.

The lignite of Monte Nerone, near Piobbio (*Pesaro and Urbino*), is many yards thick—it occurs in *Alberese* limestone. It is supposed that there is a good deal of lignite in this Province, both in the Sub-Appennine marls and in the Cretaceous rocks.

1 kilo. produces, by distillation, 200 litres of gas.
„ „ 0·66 kil. of coke.
„ „ 0·88 kil. fluid bituminous matter.
„ „ 0·06 kil. ammoniacal water.

without a trace of sulphur.

The specific gravity is 1·17; it loses 6 per cent. of its weight on being dried. The calorific power is stated by Guidi to be 4 : 5 compared with true coal. It has not hitherto been worked.

Good lignite is mentioned by Prof. Costa as occurring on the Tordino, in Val S. Giovanni, near Teramo (*Abruzzo Ulteriore* I.) In the province of Abruzzo Citeriore on the Adriatic, good lignite occurs at many places, as at Guardiagrele, Pennapiedimonte, Gessopalena, Roccascalegna, &c. Some of the best lignite in the Italian department of the Exhibition is that from Corsoli, in the Abruzzi; unfortunately, it is impossible to judge from a small specimen whether there would be sufficient to render it fit to work. At Baranello (*Molise*), excellent lignite is found in micaceous argillaceous schists. Small lignite basins are abundant in Calabria, as at Gerace, Squillace, Catanzaro, &c., they are not worked.

The carboniferous formation has been found to exist in the centre of the island of Sardinia, by General la Marmora, near the villages of Seni and Perdas de fogu, but it is so broken up by porphyry eruptions, which have converted the coal into anthracite, as to be of no industrial importance, the more so as there are no roads to convey it to the sea.

Two Eocene lignite basins occur near Iglesias (*Cagliari*), those of Gonnesa and Villamassargia, the former calculated by Signor Marchese to have an area of 50, the other of 100 square kilometres. There are several beds of lignite in the basin of Gonnesa, in which four mining concessions have been granted, viz., Terras de Collu, Bacu Abis, Fontanamare and Terra Segada. At Terras de Collu a bed of about 2½ feet has been found immediately under a stratum of limestone, which renders it very convenient for working. Two beds, respectively 1ft. 8in., and 2ft. 8in., might be utilized at Bacu Abis. At Fontanamare is a bed of 3ft. 6in., only divided into two by a very thin layer of black clay, and which might be turned to account like the others for local consumption, were it not for the entire absence of road communication.

Of the lignite in Sicily, that of Milazzo (*Messina*), is of very inferior quality; but, by a proper geological examination of the island, it is very probable that many places might furnish lignite of far better quality.

Analyses of Anthracite and Lignite from Northern and Central Italy.

	ANTHRACITE.		LIGNITE.					
	Friedruz (*Turin*).	Le Cretaz, Le Villaret, and Bosco della Golett (*Turin*).	La Borasina (*Genoa*).	Cadibona (*Genoa*).	Sarzana (*Genoa*).	Bagnasco and Nucetto (*Cuneo*).	Poggi di Ceva (*Cuneo*).	Monte Nerone, Piobbio (*Pesaro and Urbino*).
Carbon	49·3	48·0	32·55	46·5	37·68	35·4	43·85	46·3
Volatile matter	10·1	13·0	47·20	47·4	64·03	49·0	51·00	46·8
Ashes	39·6	39·0	20·55	6·1	8·29	15·5	5·15	6·9
Total......	99·0	100·0	100·30	100·0	100·00	99·9	100·00	100.0
Quantity of lead reduced	17·0	15·0	18·71	20·5		17·76	19.33	

PRODUCTION OF ANTHRACITE AND LIGNITE IN THE FORMER KINGDOM OF SARDINIA, FROM 1851 TO 1857, IN MYRIAGRAMMES.

NAME OF MINE.		1851.	1852.	1853.	1854.	1855.	1856.	1857.
Le Cretaz (*Turin*)	Anthracite.	24,620	18,470	29,180	5,000	4,000	1,000	670
Bosco della Golletta (*Turin*).	„	6,000	4,000	3,000	2,500	2,000	400	360
Bagnasco and Nucetto (*Cuneo*)...	Lignite.	450,000	200,000	200,000	400,000	468,040	...	
Poggi di Ceva (*Cuneo*)	„	700	...	...	...	700	...	
Cadi Bona (*Genoa*)	„	200,000	160,000	390,000	1,500,000	2,000,000	2,405,050	
Momello mine, Lanzo (*Turin*)...	„	...	...	...	...	...	7,400	
Boca (*Novara*)	„	...	...	...	2,000	4,000	11,000	
La Borasina (*Genoa*)	„	...	...	...	..	400	400	
Terras de Collu (*Cagliari*)	„	...	...	...	150,000	..	...	

Petroleum is found in numerous places in Italy, especially in the Appenines. In general it issues between the Pleiocene and Pleistocene strata, and is procured by digging wells, where it floats at the surface of the water, from whence it is removed from time to time. Such artificial pits exist at Montechiaro, near Placenza, Amiano, near Parma, Monte Zibio, Monte Festino and Monte Bonello, near Modena. Brugnatelli estimates the quantity which might be daily procured at Amiano, as 1,500 lbs. At Monte Zibio it is in immediate contact with a lignite bed. At Pietramala on the southern slope of the Appennines, and close to the road from Bologna to Florence, there is a naphtha spring, known as the *Vulcano*, whence flames issue constantly, and may be seen distinctly at night.

Spontaneous combustion is also observed in the Borra di Cinatti, near Berberino, in Val d'Elsa (*Pisa*). The bituminous calcareous tufa at S. Querceto (*Sienna*), gave Bechi on distillation 4 per cent. of oil, whence naphtha could be procured by re-distillation.

It may appear to some that the result of this brief examination of the lignite fields of Italy is unfavourable. Far otherwise. Fuel may not, indeed, be abundant, but that is no reason why the small quantity she possesses should be thrown away. It is a wise Providence which has so arranged that no country, however favoured, should be able to do without the others, and while the liberty which Italy now enjoys, and the numerous inducements to rouse herself from lethargy, all point to the necessity of developing the industrial resources and manufactures of the country, it will be no less imperative to encourage foreign trade in those commodities which, like coal, she does not possess, in exchange for those she exports.

The inferior qualities of lignite in Italy, though not possessing great calorific power, contain mineral oils which might be turned to good account by distillation, and return large profits. It need only be mentioned that at Halle, in Prussian Saxony, the manufacture of oil paraffine, and the valuable series of tar dyes, from Tertiary brown coal, has been carried on of late years with wonderful success, and is daily increasing. What an advantage it would be if the lignite scattered through more than a dozen provinces of Italy, should be employed in the manufacture of oil and candles, which might be as easily and extensively exported to Western Europe as those of Prussia. The Italian Government would do well to give every encouragement to the establishment of such manufactories in Italy, as the high prices at which the products of distillation are sold would permit them to form an important article of export.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-second Annual Meeting of the Association commenced on Wednesday, October 1, 1862, at Cambridge, under the direction of the following officers:—

President.—The Rev. Robert Willis, M.A., F.R.S., Jacksonian Professor of Natural and Experimental Philosophy, Cambridge.

Vice-Presidents.—The Rev.—Phillips, President of Queen's, Vice-Chancellor of the University; the Very Rev. the Dean of Ely, D.D.; the Rev. W. Whewell, D.D., F.R.S., Master of Trinity College; the Rev. A. Sedgwick, M.A., F.R.S., Woodwardian Professor of Geology; G. B. Airy, Esq., M.A., F.R.S., Astronomer Royal; Rev. J. Challis, M.A., Plumian Professor of Astronomy and Experimental Philosophy; G. G. Stokes, Esq., M.A., F.R.S., Lucasian Professor of Mathematics; J. C. Adams, Esq., M.A., F.R.S., Lowndesian Professor of Astronomy and Geometry, and President of the Cambridge Philosophical Society.

General Secretary.—William Hopkins, Esq., M.A., F.R.S., St. Peter's College, Cambridge.

Assistant-General Secretary.—John Phillips, Esq., M.A., LL.D., F.R.S., Professor of Geology, Oxford.

Local Secretaries.—C. C. Babington, Esq., M.A., F.R.S., Professor of Botany, St. John's College, Cambridge; G. D. Liveing, Esq., M.A., Professor of Chemistry, Cambridge; Rev. N. M. Ferrers, M.A., Gonville and Caius College, Cambridge.

General Treasurer.—W. Spottiswoode, Esq., M.A., F.R.S., 19, Chester-street, Belgrave-square, London, S.W.

Local Treasurer.—Rev. W. M. Campion, B.D., Tutor of Queen's College, Cambridge.

The General Committee held its first meeting in the Guildhall, on Wednesday, October 1st, at one p.m., for the election of sectional officers, and the despatch of business.

The following report from the Council was read and adopted:—

1. The Council were directed by the General Committee at Manchester to maintain the establishment of the Kew Observatory, and a grant of £500 was placed at their disposal for the purpose. They have received at each of their meetings regular accounts of the proceedings of the Committee of the Observatory, and they now lay before the General Committee a General Report of these proceedings during the year 1861-62. (See Report of Kew Committee for 1861-62).

2. A sum of £40 was placed at the disposal of the Kew Committee for the employment of the Photoheliometer; and a further sum of £150 for the purpose of obtaining a series of photographic pictures of the Solar surface, with the co-operation of the Royal Society. The Report of the Kew Committee will make known the results of these recommendations.

3. The Report of the Parliamentary Committee has been received by the Council for presentation to the General Committee to-day, and is printed for the information of the Members.

4. The Council have to regret the absence from this Meeting of the General Secretary, Mr. Hopkins, through indisposition, which they sincerely hope will soon be removed.

5. The "Classical Index" to the Transactions of the Association, which was authorized to be prepared under the direction of Professor Phillips, is completed in one of the main divisions; the remainder will be printed without delay, and will be delivered to the Members who have subscribed for it before the end of the present year.

6. At that date it is the request of Professor Phillips to be allowed to withdraw from the office of Assistant-General Secretary to which he has been appointed, by Annual Election in the General Committee, for nearly thirty-two years. Having for two years received the useful aid of Mr. G. Griffith, M.A., of Jesus College, Oxford, he has expressed to the Council his conviction of the fitness of that gentleman to undertake the duties which have been so long entrusted to himself.

7. The Council having considered the subject, and having ascertained from Professor Phillips that he would be happy to co-operate with Mr. Hopkins as Joint General Secretary in the next year, recommend that the arrangement here suggested be carried out by the General Committee.

8. The Council received in April, 1862, a communication from Mr. John Taylor, Jun., and Mr. Richard Taylor, requesting that on account of his great age, their father, Mr. Taylor, might be relieved of all further duties as General Treasurer and Co-Trustee of the Association. The warmest thanks of the Council were given to Mr. Taylor, for his kind attention and most valuable services rendered to the Association in two important offices, as one of the Trustees and sole General Treasurer, and their regret that any cause should render it necessary for him to desire to be relieved from the duties which he has so efficiently performed for the great advantage of the Association, almost from its foundation.

9. Sir Philip de Grey Egerton, Bart., was then requested to accept the office of a Trustee of the British

Association; and Mr. W. Spottiswoode to undertake the duty of General Treasurer to the Association.

These gentlemen have kindly consented to act, and have entered on their duties.

10. The Council have been informed that Invitations will be presented to the General Committee at this meeting on Monday, October 6, from Newcastle-on-Tyne, Birmingham, Bath, Nottingham, and Dundee.

11. That the Vice-Chancellor of the University of Cambridge and the Rev. Professor Challis be elected Vice-Presidents for the next year.

The First General Meeting of the Association was held in the Guildhall, on Wednesday, October 1st, at eight, p.m., precisely, when William Fairbairn, Esq., LL.D., F.R.S., resigned the chair, and the Rev. Robert Willis, M.A., F.R.S., Professor of Natural Philosophy in the University of Cambridge, assumed the presidency and delivered an address, from which the following are extracts:—

I have the honour to announce to you that we are now opening the 32nd meeting of the British Association, and are for the third time assembled in this University. At its first coming hither in 1833, its organization was scarce completed; its first meeting having been devoted to explanations, discussions, and allotment of work to willing labourers; its second meeting to the reception of the first instalment of those admirable preliminary reports which served as the foundation of its future labours, and to the division of scientific communication to the sectional committees. But it was at Cambridge that the original plan of the association bore fruit by the receipt of the first paper, which contained the results of experiments instituted expressly at the request of the association. The success of the association was now confirmed by the numbers of compositions and annual subscriptions paid in; and by the help of these funds a most important measure was introduced —namely, the practice of granting, in aid of philosophical researches, to be undertaken by individuals or committees at the request of the association, sums of money to meet the outlay required for apparatus or other expenses, which could not be asked from persons who were otherwise willing to devote their time to the advancement of science. It was at Cambridge that the importance and authority of the association had become so manifest that the first of its applications for Government assistance towards scientific objects was immediately complied with by the grant of £500 to reduce the Greenwich observations of Bradley and Maskelyne. At this third meeting improvements were made in the distribution of the sciences into sections, and a section of statistics added. The only change in this respect that was subsequently found necessary was in the establishment of a separate section for mechanical science applied to the arts, in 1837. The employment of alphabetical letters to distinguish the sections had been introduced in 1835.

I have said enough to claim for the Cambridge meeting the honour of completing the development of the association, and I may be permitted to quote from our fourth report the gratifying assurance that so obvious was the utility of the proposed undertaking that in its very infancy there were found several distinguished individuals, chiefly from the University of Cambridge, who volunteered to undertake some of the most valuable of these reports which appeared in the first volume of the proceedings. With a mixture of regret and shame I confess that although my name is enrolled in the honourable list of those who undertook reports, it will be sought in vain amongst those who promptly performed their promises. Yet I may be permitted to say that I still hope to be enabled at some future time to complete the "Report on Acoustics," of which I delivered merely an oral sketch at the second meeting of the association in 1832. The association quitted Cambridge to pursue, with its matured organisation and continually increasing stability and influence, the career of brilliant and useful labours in every branch of science that it has never ceased to run during the two-and-thirty years that have elapsed since its foundation. It revisited Cambridge after an interval of 12 years in 1845; and now, after a lapse of 17 years, we have the high gratification of welcoming once more the association to this scene of its early meetings.

This appears a fitting occasion for a concise review of the leading principles and prominent labours of the body. Scientific societies, as usually constituted, receive and publish papers that are offered to them by individuals, but do not profess to suggest subjects for them, or to direct the modes of investigation, except in some cases by offering prizes for the best essay on some given branch. This association, on the contrary, is not intended to receive or record individual originality; its motto is suggestion and co-operation, and its purpose is thus to advance science by co-operation in determinate lines of direction laid down by suggestion. To give form and authority to this principle the admirable conception of suggestive reports was in the first place developed—a collection that should constitute a general survey of the sciences as they stood at the foundation of the meeting, each branch reported by some member who had already shown his devotion to the cultivation of it by his own contributions to its advancement, and each report passing in review its appointed subject, not for the purpose of teaching it, but of drawing forth the obscure and weak places of our knowledge of it, and thus laying down the determinate lines of direction for new experimental or mathematical researches. The requests for these reports were zealously responded to, and so rapidly that at the second meeting ten were received, and at the third eight others. In this manner in five or six years the cycle of the sciences was well nigh exhausted. But the series of such reports has been maintained in succeeding years even to the present time by the necessity of supplementary reports to point out not merely the advances of each science already treated, but the new lines of direction for inquiry that develope themselves at every step in advance. The reports thus described must be considered as merely preparations for the great work for which the Association was founded. They constitute the suggestive part of the scheme. The co-operative mechanism, by which each new line of research recommended in the reports was to be explored, was energetically set in motion by the annual appointment of committees, or individuals to whom these especial investigations were respectively assigned, with adequate sums at their disposal. These committees were requested to report their labours from year to year, and thus a second set of documents have been produced, which are entirely distinct from the "Suggestive Reports," but immediately derived from them, and complementary to them.

Such is a concise view of the system at first laid down by the wisdom of our founders, and which, with some modifications, has produced the inestimable contents of our present volumes.

* * * * * * * *

I will now direct your attention to the principal objects to which our funds have been directed. There are, undoubtedly, a great number of most important inquiries in science that are arrested because from their nature they require an outlay of money beyond the reach of the labourers who ardently desired to give their time and thoughts to them, and because the necessity and value of the proposed investigations are wholly inappreciable by that portion of society who hold the purse strings. But it is in the cases above alluded to of expensive investigation that the direct use and service of our body has been made the most manifest. The British Association holds its own purse strings, and can also perfectly understand when they should be relaxed. Nay, more, by its influence and character, established by the disinterested labours and successful exertions of more than thirty years, it may be said to command the national funds, for the objects in aid of which Government assistance has been requested have been so judiciously chosen that such applications have very rarely been unsuccessful, but have been, on the contrary, most cordially acceded to. Indeed, it may be observed, that from the period of the foundation of the association the Government of this country has been extending its patronage of science and the arts.

* * * * * * * *

One of the most valuable gifts to science that has proceeded from our association is the series of its printed reports, now extending to thirty volumes; yet these must not be supposed to contain the complete record even of the labours undertaken at the request and expense of the body. Many of these have been printed in the volumes of other societies, or in a separate form. Several, unhappily, remain in manuscript, excluded from the public by the great expense of publication. I am the more induced to direct attention to this great work at present because I hold in my hand the first printed sheets of a general index to the series from 1831 to 1860 * * * *; and the prospect of its speedy publication may be hailed as a great subject of congratulation.

In every annual volume there is a table of the sums which have been paid on account of grants for scientific purposes. The amount of these sums has now reached £20,000, and an analysis of the objects to which this expenditure is directed will show that if we divide this into eighteen parts it will appear, speaking roughly, that the section of mathematics and physics has received 12 of these parts—namely, two-thirds of the whole sum; the sections of geology and mechanical science two parts each, while one part has been given to the section of botany and zoology, and one divided among the sections of chymistry, geography, and statistics. If we examine the principal subjects of expenditure, we find in the first place that more than £1,800 was expended upon three catalogues of stars. £150 was applied principally to the determination of the constant of lunar nutation under the direction of Dr. Robinson in 1837, and to several other minor astronomical objects. Under the direction of Dr. Whewell, a laborious system of observations obtained by the influence and reduced at the expense of the association, who have aided this work with a sum of about £1,300, has determined the course of the tide wave in regard to the coasts of Europe, of the Atlantic, of the United States, of New Zealand, and of the east coast of Australia. More than £2,000 has been allotted to meteorology and magnetism, for the construction of instruments, and the carrying out of a series of observations and surveys in connexion with them. To this must be added a sum between £5,000 and £6,000 for Kew Observatory.

To the British Association is due, and to the suggestion of General Sabine, the first survey ever made for the express purpose of determining the positions and values of the three isomagnetic lines corresponding to a particular epoch over the whole face of a country or state. This was the magnetic survey of the British Islands, executed in from 1834 to 1835, by a committee of its members. This was followed by a recommendation from the association to Her Majesty's Government for the equipment of a naval expedition to make a magnetic survey in the southern portions of the Atlantic and Pacific Oceans. This recommendation, concurred in by the Royal Society, gave rise to the voyage of Sir James Clark Ross in the years 1839 to 1843. In a similar manner was suggested and promoted the magnetic survey of the British possessions in North America, authorized by the Treasury in 1841; the completion of the magnetic survey of Sir James Ross, by Lieutenant Moore and Lieutenant Clerk in 1845, in a vessel hired by the Admiralty; the magnetic survey of the Indian seas by Captain Elliot in 1849, at the expense of the Directors of the East India Company; and the magnetic survey of British India, commenced by Captain Elliot in 1852, and completed between 1855 and 1858 by Messrs. Schlagintweit. Finally, in 1857, the British Association requested the same gentlemen who had made the survey of the British Islands in 1837 to repeat it, with a view to the investigation of the secular changes of the magnetic lines. This has been accomplished, and its results are printed in the new volume for 1861. The association also, aided by the Royal Society, effected the organization in 1840 of the system of simultaneous magnetical and meteorological observations established as well by our own Government as by the principal foreign Governments at different points of the earth's surface. In 1854, in consequence of representations originating with the British Association, our Government created a special department in connection with the Board of Trade, under Admiral Fitzroy, for obtaining hydrographical and meteorological observations at sea. Observations on the wind have been carried on by means of the various self-registering anemometers of Dr. Whewell, Mr. Osler, Dr. Robinson, and Mr. Beckley, which instruments have been improved, tested, and thoroughly brought into practice by the fostering care of our body; and by the aid of its funds experiments have been made on the subterranean temperature of deep mines, and on the temperature and other properties of the atmosphere at great heights by means of balloon ascents. Four of these were made in 1852, in which heights between 19,000 feet and 20,000 feet were reached. But in the present year Mr. Glaisher has attained an altitude of nearly 30,000 feet. Earthquake shocks were registered in Scotland by a committee of the association from 1841 to 1844, and Mr. Mallet commenced in 1847 a most valuable series of reports on the facts and theory of earthquake phenomena from the earliest records of our own time.

* * * * * * * *

The President then gave a brief account of the Kew Observatory, the creation of which, he said, must be regarded as one of the triumphs of the British Association. As far as the association is concerned, its maintenance has absorbed between £5,000 and £6,000, and the annual sum alloted to it from our funds has for each of the last six years reached the amount of £500. The construction of the photoheliograph may be quoted as an example of the facilities given by this establishment for the developing and perfecting of new instruments of observation. A suggestion of Sir John Herschel, in 1854, that daily photographs of the sun should be made has given birth to this remarkable instrument, which at first bore the name of the solar photographic telescope, but is now known as the Kew photoheliograph. * * * * On occasion of the eclipse in 1860 this instrument was conveyed to Spain, under the care of Mr. Delarue, who most successfully accomplished the proposed object by its means. Mr. Delarue, in consequence of the presence of the heliograph at Kew being found to interfere with the ordinary work of the establishment, has kindly consented to take charge for the present of the instrument at this observatory and at his own observatory when celestial photography is carried on. But it is obvious that the continuation of these observations for a series of years, which is necessary for obtaining the desired results, cannot be hoped for unless funds are provided.

I cannot conclude this sketch of the objects of the physical section to which the funds of the association have been principally devoted without alluding to Mr. Scott Russell's valuable experimental investigations on the motion and nature of the waves, aided by £274.

If we now turn to geology, we find £2,600 expended; of which, £1,500 was employed in the completion of the fossil ichthyology of Agassiz, and Owen's reports on fossil mammalia and reptiles, with some other researches in fossils. * * * * £2,300 has been devoted to the carrying out of various important experimental investigations in relation to the section of mechanical science. Of this sum £900 was paid between 1849 and 1844, in aid of the most important and valuable series of experiments on the forms of vessels, principally conducted by Mr. Scott Russell, in connection with the experiments on waves. This investigation was ready for the press in 1844, but it is greatly to be regretted that the great expense of printing and engraving it has hitherto prevented its publication. Nearly the same sum has given to us various interesting and instructive experiments and facts relating to steam engines and steam vessels, carried on by different committees from 1838 to the present time, among which may be specially noted the dynamometric instruments of MM. Morin, Poucelot, and Moseley, to ascertain the duty of steam engines from 1841 to 1844. Experiments on the strength of materials, the relative strength of hot and cold blast iron, the effect of temperature on their tensile strength, on the effect of concussion and vibration on their internal constitution, carried on principally by our late president, by the late Mr. Eaton Hodgkinson, at different intervals from 1838 to 1856 have been aided by grants amounting to £400. The remainder of the sum abovementioned was principally devoted to the experimental determination of the value of railway constants by Dr. Lardner and a committee in 1838 and 1841.

The section of botany, zoology, and physiology has absorbed about £1,400, of which nearly £900 has been applied to zoology, partly for the expense of dredging committees, for obtaining specimens of marine zoology, but principally for zoological researches in different districts and countries.

In botany may be remarked the labours of a committee consisting of Professors Daubeny, Henslow, and others, formed in 1840 to make experiments on the preservation of vegetative powers in seeds, who continued their work for 16 successive years, reporting annually, and assisted by a sum of £200. The greatest age at which the seeds experimented upon were found to vegetate was about 40 years. Another committee, with Mr. Hunt, was engaged during seven years, from 1841, in investigating the influence of coloured light on the germination of seeds and growth of plants. These are specimens of the admirable effect of the organization of an association in stimulating and assisting with funds the labours of investigators in new branches of experimental inquiry.

The President then referred to the report of the Manchester meeting, and instanced some of the most striking advances since made in the various sciences. He then said:—Before I conclude I have the painful duty of reminding you that since our last meeting we have had to deplore the loss of that most illustrious patron of science and art, his Royal Highness the Prince Consort, the President of our Association at Aberdeen, and the Chancellor of this University. In the latter capacity he afforded us many opportunities of observing his scientific attainments and genuine zeal and love for all branches of knowledge. His gracious kindness and respect for men of science and literature have left an impression upon us that can never be effaced. I must also ask a tribute to the memory of our late professors of chymistry and botany, both of whom did in their lifetime excellent good service to science, and more especially to the British Association—Professor Cumming contributing one of the invaluble primary reports upon which our proceedings were based, as well as other communications; Professor Henslow by various reports, some of which I have already alluded to.

At the close of the address,

Professor Owen moved a vote of thanks to the learned President for his comprehensive, varied, and excellent address.

The Dean of Ely seconded the motion. The clergy of the Church of England most cordially recognized the excellence of the work of the British Association, and with all heartiness and solemnity wished them God-speed in their great work.

The resolution was carried with acclamation.

Professor Willis acknowledged the compliment; after which the meeting broke up.

The sections and officers are the following:—

Section A.—Mathematical and Physical Science.

President:—G. G. Stokes, Esq., M.A., F.R.S., Lucasian Professor of Mathematics.

Secretaries:—Professors Stevelly, H. J. S. Smith, and R. B. Clifton.

B.—Chemical Science.

President:—W. H. Miller, M.A., Esq., F.R.S., Professor of Mineralogy.

Secretaries:—W. Odling, Esq., M.B., F.R.S., and H. W. Elphinstone, Esq., M.A.

C.—Geology.

President: J. B. Jukes, Esq., M.A., F.R.S., Director of the Geological Survey of Ireland.

Secretaries:—Professor T. Rupert Jones, and Lucas Barrett, Esq.

D.—Zoology and Botany, including Physiology.
In the Hall of Gonville and Caius College.

President:—Thomas Huxley, Esq., F.R.S., Secretary of the Geological Society.

Secretaries:—Dr. E. P. Wright, and A. Newton, Esq., M.A.

Sub-Section D.—Physiology.

President:—G. E. Paget, Esq., M.D.

Secretaries:—Edward Smith, Esq., M.D., F.R.S., and G. F. Helin, Esq.

E.—Geography and Ethnology.

President:—F. Galton, Esq., M.A., F.R.S.

Secretaries:—Dr. Norton Shaw, and Thomas Wright, Esq., M.A.

F.—Economic Science and Statistics.

President:—Edwin Chadwick, Esq., C.B.

Secretaries:—Edmund Macrory, Esq., and H. D. Macleod, Esq.

G.—Mechanical Science.

President:—William Fairbairn, Esq., LL.D., F.R.S.

Secretaries:—P. Le Neve Foster, Esq, M.A., and W. M. Fawcett, Esq., M.A.

ELECTRIC FIRE TELEGRAPHS ON THE CONTINENT.

The following is a translation of a description of the electric fire telegraph at Stuttgard:—

This telegraph was first proposed by, and carried out from the plans and under the superintendence of the telegraph-inspector, Geiger. In its use it serves a double purpose:—First, to give timely notice to the parties immediately interested in the outbreak of a fire; secondly, to enable the Police Board to exercise a control by day and night over the fire watchmen stationed on the watch towers.

The wires have their central point in the City Police Office, and extend from thence to the tower of the cathedral (Stiftskirchenthurm) and the Infirmary Church Tower (Spitalkirchenthurm), which constitute the first telegraph circle. From thence they extend to the Royal Town Administration Office, the Town Hall, Guard-room, the dwelling of the Commander of the Fire Brigade, the Barracks, and the Chief Guard-house, which constitute the second telegraph circle.

At the City Police Office are placed the electrical battery, the alarm, the keys (similar to the manual of a pianoforte), and the printing apparatus upon Morse's principle. In each of the towers is an alarm, on which the signals are given from the police office, and a key or handle with which to return the signals. The alarm is so placed that it can be heard by the watchman (when "watchman" is mentioned in this description it means a *hugo*, those on the two towers) in his room as well as when he is on his rounds. The handle is so arranged that the watchman can get at it without having to make a perfect round. In the Royal Town Administration Office is also an alarm and a key or handle; the rest of the stations of the second circle, however, have only an alarm, so that they can only receive, but not give signals.

In order to be able to give notice in which part of the town a fire has broken out, the town is divided into three "rayons" or circles, the cathedral being the centre, which are called the inner circle, the outer circle, and the environs of the town. From the centre point of the octagon gallery of the tower eight radii are formed, which divide each rayon into eight, whereby the town and its environs become divided into twenty-four districts. Each space between two radii has a special number, and a plan of the town divided in this manner is kept at each telegraph station. The telegraphing is carried out by means of pressing down the keys, and the signals are known by the number of strokes, and by the space of time between each stroke. The printing apparatus registers these by means of dotes, strokes (—), and spaces. The signal on the alarm is either a simple short blow—so long as one can count 1, 2, 3, quick—or a sort of ringing, done by striking the key continuously till one counts from 1 to 6. A space is the time between taking the finger off the key and again striking it. The space is a "short" one when 1, 2, 3, are counted, and a "long "one when one counts to 6 before again striking the key, both being counted quick. To enable the City Police Office to give a telegram to the second telegraph circle, two slides, numbered 1 and 2 on the apparatus are put in. The printing apparatus can work slow or fast, as wished. The slow motion is used when controlling the watchmen, the quick motion when giving notice of a fire.

The signals for the announcement of a fire are as follows:—First, "The summons," whereby all the stations which it is intended to communicate with have their attention called that a telegram is coming. The summons of the watchmen to the City Police Office consists of 6 strokes and 5 short spaces. That from the cathedral is once rung, and that from the infirmary twice rung with a long space. The summons of the City Police Office on all the stations is three times rung with two long spaces. Secondly, "Understood or ready." This is the answer from the station communicated with, that all is in readiness to receive the telegram. This signal consists of six strokes and five short spaces, both for the watchmen as well as for the police office. The answer "understood" has to be returned every time when a telegraph to announce a "fire," "danger," or "situation of the danger" of "fire" is given. When not given, the telegram is repeated till the answer is returned. Thirdly, "Danger." When the watchmen observe an unusual quantity of smoke, such as to give him cause to apprehend a fire may break out, or notices in the environs of the town an unimportant fire in any of the gardens, he gives this signal with 12 strokes and 11 short spaces. Fourthly, "Fire." If, however, he observes actual flame, he then immediately gives the fire signal, which consists of 30 to 40 strokes given quickly one after the other. Fifthly, "Situation of the danger or fire." After the watchman has given notice of the "danger" or "fire" he waits until he can count 18, and then gives notice where the "danger" or "fire" is. The numbers 1 to 8 signify the spaces lying between each two radii, and are given notice of by 1, 2, 3, &c., with long spaces. These numbers without any addition denote the inner circle. Should, however, one of the outer circles have to be denoted he must count 18 after the number has been given, and then give 2 strokes, with a long space, for the outer circle, and 3 strokes, with 2 long spaces, for the environs. If the watchmen give notice of "danger," the city police give notice of this to the second telegraph circle, that all may hold themselves in readiness in case of emergency, and the police immediately investigate whether ground for danger really exists or not. In the affirmative case the watchman get notice to give the "fire" alarm (see No. 4), which is immediately done. The city police give also the same alarm to the second circle. If, however, it is found unnecessary to give the "fire" signal, then the watchmen and the second circle receive the signal "no danger," which consists of 3 strokes and 2 short spaces. That the second circle may understand this more certainly the city police repeat the signal after a long space of time. The signals for controlling the watchmen are—Firstly, "The summons," which the police office, as before, telegraph to the two towers, with 3 strokes and 2 long spaces, which takes place at the time when the night duty begins. The night duty is, in the months of December and January, from six o'clock in the evening till seven o'clock in the morning; from February till April, and September till October, eight o'clock to six o'clock; and from May till August, nine o'clock to five o'clock. Secondly, "Night duty begun" is the answer the watchmen give to this signal. The watchmen at the cathedral answer with a signal stroke, that at the infirmary with 2 strokes and 1 long space. Each watchman has to repeat this signal every half-hour—the one at the cathedral at the half and full hours, and the other at the infirmary at the quarters and three-quarters. In the daytime these signals are repeated every hour, viz., from the cathedral at the full hours, and from the infirmary at the half-hours. Thirdly, After the police office have signalised the watchmen, they also signalise the second circle at the commencement of the night duty, with 3 strokes and 2 long spaces, to see that the whole of the apparatus is in proper working order, and are answered from the Royal Town Administration Office with "telegraph in order" by a single stroke. This call No. 3 is also heard at all the other stations of the second circle, but has for them no meaning, and they take no notice of it. Fourthly, The printing apparatus is principally to control the watchmen, and is so constructed that each time the watchmen press on the finger or handle in the towers, a short stroke (—) is indented on a strip of paper in the apparatus, which strip of paper can be made to travel quicker or slower through the instrument or stopped altogether as wished. For controlling, with slow motion, the papers travel at the rate of 4in. in the hour, and so long as the watchmen give their signals regularly, the strokes follow each other at equal distances; should one of the watchmen, however, omit giving the signal, the strokes in this instance will be double as far apart as the rest; thus the watchmen are controlled without the presence of a third party.

At each station hangs a table with all the signals hereto given, so that any of the parties interested can at any time see what signals to give or what they signify.

Should a fire break out at night, at which time the fire brigade are on duty at the police office, they immediately start off to the scene of the fire, with the fire escape waggon; should the signal "Danger" be given they get themselves in readiness and wait for further instructions from the police, after the latter have investigated whether fire is present or not.

Thus, by the aid of this institution, it is now made possible, as soon as danger of fire is apprehended, to give notice of the same in the shortest possible time to the authorities and all parties interested, and at the same time to avoid all unnecessary alarm where no actual danger exists.

The following is a description of an electro-magnetic telegraph in connection with the fire establishments in Berlin:—

The electro-magnetic telegraph (Morse's system), which was first laid down in 1851, embraces the whole of the thirty-six police districts of the city, most of the dwellings of the police-lieutenants in which fire watch is kept, as well as the five outlying fire stations; and, further, the dwellings of the state ministers and the general post office. This last connects it with the state telegraph, the head fire station, and, as the central point, the royal police station.

The cost of this arrangement, which was carried out under contract by Messrs. Siemens and Halske, was rather under £5,000, and the yearly expense of keeping it in order is about £750.

The staff of officers consists of an engineer, two chief and two sub-telegraphists. The duties at the sub-stations are fulfilled by the fireman on duty.

In the middle of the city, at the Royal Police Office, is the central station, from whence five electrical circuits are carried, embracing the stations of the inspectors of the fire brigade; also, a circuit to connect the different ministerial dwellings and the general post, and one line direct to the head fire station. For the before-mentioned five outlying stations, branch lines are taken from the nearest police station, which lines end in the watch room where an alarm apparatus is erected to give notice to the men on duty.

The wires are laid underground, 2½ feet deep, and are of copper, covered with gutta percha, in lead pipes, and cost about £120 a German mile (about 4⅘ths of an English mile). In the streets, where different wires meet, they are covered with earthenware covers, and in the neighbourhood of sewers or gas pipes they are laid in iron pipes to protect them from injury. Where the wires have to pass over the river Spree they are laid under the pavement of the massive bridges, but where drawbridges occur they are laid under the bed of the river in flexible pipes.

The apparatuses are Messrs. Siemen and Halske's (then) newest construction, with self-acting dial, and which, by thirty revolutions, communicates sixty to seventy words in a minute.

The batteries at the sub-stations consist each of twelve Daniell's cells; that at the chief station of eighteen Daniell's cells, with porcelain cylinders, 5 in. in diameter, 1 ft. high, and the copper and zinc elements in proportion, against which those at the sub-stations do not exceed the size of a beer glass. The whole of the apparatuses in the circuits are simultaneously fed by the battery in the central station. Attendance is constantly given at all the stations, and each despatch is accurately entered in a journal. All despatches, without any exception, must go through the central station, and through it alone are the connections of the stations with each other.

From the central station the despatches can be given either to a particular station alone, or they can be communicated to the whole of the stations simultaneously, and are distinguished by the name of station despatch, or circular despatch, accordingly. In the latter case (circular despatch), the circuit alone is used, which goes from the central station through all the stations; but, in the other case (station despatch), the circuit is made with the wire that goes to the particular station, the earth being the return. In this instance the connection to the further lying stations is, for the time, isolated, but these isolated stations can, in case of necessity, communicate any important despatch in the meantime to the central station by the remaining part of the circuit, using the earth as a return, and they are enabled to set an alarm apparatus in the central station in action.

The completion of the circuits, the forwarding and communicating the despatches, as well as the isolating, is done by a simple mechanical manipulation, for which special written instructions are given.

As an example of the mode of using the telegraph the following instance is given:—A fire breaks out, and notice it given to the nearest station, which is a police station, and whether the same is given by a private person or one of the brigade, it is immediately telegraphed to the central station. The despatch is sent in the shortest possible form, for which rules are laid down; it contains the name of the street, number of the house, and size of the fire, this last simply by the letters—G (gross), M (mittel), or K (klein), which denote large, middle, or small, as according to this is known whether many or few of the brigade must be called out. From the central station notice is then first given direct to the head fire station, and then after, per circular, to all the sub-stations, and the whole is accomplished in about eight minutes.

The arrangements at the fire stations are such that in the course of three minutes everything is in readiness to start off, so that from the moment the notice is given to the central station, in five minutes at the head station, and in eleven minutes at the sub-stations, everything is in readiness to start to the scene of the fire.

The batteries are cleaned daily by the firemen on duty; repairs required to be done have to be reported to the central station, and are ordered to be carried out by the competent officer.

The wires here referred to were the first in which copper covered with gutta percha in lead pipes was used, and up to the present time, to judge from the little repair they require, they give the best wished for results of their stability.—*Engineer.*

UNBRANNING OF WHEAT.

In a report on the alleged grievances of the journeymen bakers, just made by Mr. H. Seymour Tremenheere, to the Secretary of State for the Home Department, a process of unbranning wheat is described, which seems likely to exercise an important bearing on the supply of food. Messrs. Hadley, of the City Flower-mills, states to Mr. Tremenheere as follows:—

"We have been making experiments for some time on the mode of unbranning wheat, invented by Mr. Bentz about the year 1846, in America, and subsequently patented. The object of this process is to separate the outer cuticle, which is wholly innutritious, from an interior section of the wheat-berry, which contains mostly nitrogenous matter, and which has hitherto been lost as human food.

"There are two leading advantages in this process. First, the cleanliness of the flower produced. In grinding by the ordinary process it is impossible to render the flour entirely free from dust and dirt. After putting the wheat through two or three processes of cleaning in the common way, there will still be some dirt remaining in it. All flour always contains more or less of this dust. There is also a portion of the beard of the wheat, a kind of fibrous appendage, which is always ground up with it; no process hitherto known has been able to get rid of it.

"By Mr. Bentz's process, as the exterior cuticle is entirely removed previously to grinding, the flour is necessarily perfectly clean, and free both from dust and this fibrous down.

Secondly, by the ordinary mode of grinding, the result obtained is 76 per cent. of flour for human use. By the new process we find, after a series of very careful experiments, extending over several months, that we obtain about 86 per cent. of the whole berry available to make bread.

"The money value of this increase of 10 per cent. is subject to a deduction of about one-half in consideration of the lessened quantity of offal, the value of which we may take at half of that of the flour if used as human food. The offal is used for many purposes, which give it a value larger than would at first sight be conjectured.

"In addition to this net increase of 5 per cent. in value of flour available for human food, the flour made by this process, containing all the nitrogenous or nutritious matter existing in the berry hitherto lost, yields a large increase in the number of loaves per sack. From the trials which we have ourselves made, we are satisfied that that increase may be safely stated at 20 lbs. of bread per sack of flour. This, taking the common average yield of a sack of flour at 90 four-pound loaves, or 360 lbs. of bread, amounts to an increase of upwards of 5 per cent. on the bread (18 lbs. would be exactly 5 per cent.)

"The aggregate gain in flour and bread may therefore safely be stated at 10 per cent.

"There is also another source of gain in a national point of view, in the increased nutritive value of the whole mass of the flour made by this process."

Dr. Dauglish, whose paper descriptive of his process of making aërated bread was read before the Society of Arts, in reference to this method of unbranning states as follows:—

"The invention was brought under the notice of the French Emperor, who caused some experiments to be made in one of the French bakeries, to test its value. The experiments were perfectly satisfactory, so far as the making of the extra quantity of fine flour was concerned, but when this flour was subjected to the ordinary process of fermentation, and made into bread, much to the astonishment of the parties conducting the experiments, and of the inventor himself, the bread was brown instead of white. The consequence of course has been, that the invention has never been brought into practical operation. But about four years ago a French chemist, M. Mége Mouriès, directed his attention to the subject of utilising, for the purpose of white bread-making, the nutritious substances ordinarily thrown away with the bran, and the results of his inquiries were communicated in a memoir to the Academy of Sciences, on the 9th June, 1856, and have since been reported on by MM. Dumas, Pelouze, Payen, Peligot, and Chevreul.

"These results explain most satisfactorily the cause of failure of the flour prepared by the American method to make white bread.

'Before the publication of M. Mouriès' researches, the nutritious substance attached to the bran was considered by chemists to be a portion of the gluten of the grain, but it now proves not to be gluten at all, but chiefly a new nitrogenous body, analogous to gluten, which the discoverer has named 'cerealine,' with a portion of another well-known nitrogenous body—'vegetable caseine.'

"Among the properties of this body, cerealine, M. Mouriès gives the following:—

"It is soluble in water, and insoluble in alcohol. It acts as a ferment on starch, dextrine, glucose, or grape sugar. It alters gluten extremely, and gives to the altered matter a brown colour. Its peculiar action, when brought into contact, in the process of fermentation, with the ordinary constituents of fine white flour, is the true cause of the dark-brown colour imparted to the bread made from flour in which the cerealine was retained.

"M. Mouriès, having satisfied himself as to the properties of cerealine, adopted a method by which its peculiar action was neutralised, and then made bread by the ordinary process of fermentation, in which the whole of the bran contained in the internal coat of the grain was allowed to remain. The result was a loaf having merely an orange colour, but none of that dark-brown colour which always results when the bran contained in the internal coat of the grain is used in bread made by the ordinary method.

"In like manner, by my process, in which the fermentative changes are never allowed to take place, bread made from wheaten meal, from which only the coarse bran has been separated, is so free from the dark-brown colour that it is difficult to persuade people that it is made from wheaten meal at all."

Proceedings of Institutions.

Wolverhampton Young Men's Christian Association.—The fourth annual report says there was much cause for congratulation and thankfulness. During the past year Mr. Brittain, who has been so long connected with the Institute, has felt it his duty to resign his position as assistant-secretary, and the Committee feel it a pleasure to record their sense of the value of his services. The vacancy has been filled by the appointment of Mr. Butterworth, who was one of the earliest committeemen. In the Bible Class 56 young men have enrolled themselves as members, 44 of whom are more or less regular in their attendance. Strangers have paid 133 visits. The total of general members for the past four years have been as follows:—1858, 175; 1859, 200; 1860, 285; 1861, 304. The reading-room has been largely attended. During the year public lectures were delivered by the Rev. A. Mursell, of Manchester; Mr. Thomas Cooper, of London; Rev. Dr. Brock, of London; Mr. E. Wheeler, the electrican, and Henry Vincent, Esq.; and though these lectures were of an attractive and instructive character, yet a serious loss was entailed by them, for whilst the attendance of the members was always large, yet the general public did not countenance them to the extent anticipated. The social tea-meetings have secured the presence of a large proportion of the members, and have proved a very pleasant medium of intercourse. Classes have been conducted for the study of the following subjects:—Animal physiology, structural botany, mathematics, arithmetic, shorthand, instrumental music, English grammar and composition, writing, and French. The gentlemen who have kindly conducted them have in every case been thoroughly competent, and the result has been not only the securing a large number of students, but great progress on the part of many of the students. The library has been considerably enlarged during the year, between 300 and 400 vols. having been added, and is still supplied with new works from Mudie's library. The circulation of books has been, in the twelve months, about 3,500. The first prize for the essays, written at the request of the recent conference of employers of labourers, has been awarded to a member of this Institute, Mr. J. Purslow, and the third prize was awarded to a member of an affiliated society at Westbromwich. In the latter part of the report for the preceding year, an appeal was made with the view of raising a sum that would pay off the debt, pay the expenses of furnishing and fitting-up the new premises, and make an addition to the library. This appeal was well responded to, and notwithstanding the depressed state of trade, the bazaar held for the purpose was highly successful. The bazaar account shows a net profit of £200 7s. 3d. The cash statement for the year shows that the expenditure has been £525 19s. 6d., and that there is a balance due to the treasurer of £3 18s. 6½d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, September* 19*th*, 1862.]

Dated 9*th September*, 1862.

2481. W. Hirst, Halifax—Imp. in machinery to be employed in the manufacture of paper or linen spool tubes, which machinery is also applicable for the manufacture of cartridge cases.
2482. J. Walker, Norwich—Imp. in the manufacture of oil presses.
2483. T. Fleitmann, Iserlohn, Prussia—Imp. in the manufacture of copper from copper ores.

Dated 10*th September*, 1862.

2485. J. Saunders, 7, Mordin-place, Lewisham-road, Kent—A new or improved railway break.
2487. J. Vigouroux, Nimes—An inoxydable white metal suitable for making taps or cocks, and other useful articles.
2491. A. Rigg, jun., Chester—Imp. in apparatus for carrying and tipping coal and other minerals, and in steam brakes used therewith, and with other machinery.

Invention with Complete Specification Filed.

2536. E. Astel, Paris—Imp. in urinary utensils, also applicable to fixed and portable commodes.—16th September, 1862.

[*From Gazette, September* 26*th*, 1862.]

Dated 19*th May*, 1862.

1516. T. Morris and R. Weare, Birmingham, and E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in obtaining and applying light and heat by electricity.

Dated 23*rd May*, 1862.

1562. A. Samuelson, 28, Cornhill—Imp. in the working of hydrostatic presses, and in the apparatus employed therein.

Dated 29*th July*, 1862.

2154. D. B. Clark, Lower Polgooth, St. Ewe, Cornwall—Imp. in the manufacture of candles, and in apparatus employed therein.

Dated 7*th August*, 1862.

2211. A. Thiriez, Lille, France—A new machine for glossing and glazing all thready fabrics.

Dated 11*th August*, 1862.

2244. J. Lancelott, Birmingham—Imp. in the manufacture of ornamental chains for sheet metal.

Dated 21*st August*, 1862.

2339. A. Boubee, Paris—Improved apparatus for casting or moulding glass and imitating precious stones or marbles.

Dated 27*th August*, 1862.

2371. G. Davies, 1, Searle-street, Lincoln's-inn—A machine for singer ing woven fabrics of cotton, wool, or silk by means of gas o-alcohol. (A com.)

Dated 29*th August*, 1862.

2401. W. Owen, Rotherham, Yorkshire—Imp in the manufacture of railway wheels and tyres, and in securing tyres to wheels.

Dated 30*th August*, 1862.

2410. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in coating or covering metallic surfaces with copper. (A com.)

Dated 1*st September*, 1862.

2412. J. G. N. Alleyne, Butterley Iron Works, Alfreton, Derbyshire, and Capt. J. Roberts, 3, Essex-court, Temple—Imp. in the manufacture of flanged wrought iron or steel plates, and of wrought iron beams and frames of a trough-shaped section, and in the apparatus employed for that purpose.

2418. E. G. Fitton, Ardwick, Lancashire—Imp. in machinery for winding yarn or thread on to bobbins or spools.

Dated 2*nd September*, 1862.

2425. J. Mosheimer, Manchester—Certain imp. in machinery for amalgamating gold and silver or the ores thereof.

Dated 4*th September*, 1862.

2448. H. L. Emery, Foulis-terrace, Brompton—Improved machinery for ginning cotton.

Dated 5*th September*, 1862.

2452. W. E. Bovill, 22, James-street, Buckingham-gate, Westminster—Imp. in the mode of applying oil and other fluid lubricating matters to machinery. (A com.)

Dated 8*th September*, 1862.

2471. J. Whitehead, David-street, Manchester—Certain imp. in looms for weaving.

2472. J. Hartshorn, Mansfield-road, Nottingham, and W. Redgate, Nottingham—Imp. in means or apparatus for the manufacture of lace fabrics.

Dated 9*th September*, 1862.

2473. C. Fink, Berlin, Prussia—An improved turbine.

2474. G. W. Belding, 7, King-street, Cheapside—Imp. in wringing machines. (A com.)

Dated 10*th September*, 1862.

2484. J. Saunders, 7, Mordin-place, Lewisham-road, Kent—Imp. in lamps.

2486. M. Smith, Heywood, Lancashire—Imp. in machinery for raising the nap on woven fabrics. (A com.)

2488. F. Hands and H. Holland, Birmingham—New or improved compositions for the manufacture of black ornaments, such as brooches, bracelets, ear-rings, and other ornaments usually made of jet, which said compositions may also be applied to the manufacture of various other articles.

2490. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in traction engines, and in apparatus for indicating the pressure of steam.

2492. G. T. Bousfield, Loughborough-park, Brixton, Surrey—Imp. in machinery used in the manufacture of files. (A com.)

2494. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for cutting files. (A com.)

Dated 11*th September*, 1862.

2496. T. Steel, Bradford—Imp. in treating soap suds or other saponaceous or oily matters.

2498. C. R. Humphrey, 69, Old-street, St. Lukes—Imp. in printing machinery.

2502. W. Clark, 53, Chancery-lane—Imp. in cigar and cigarette cases. (A com.)

2504. J. Thomson, Seafield Works, Dundee—Imp. in the treatment of vegetable fibres with a view to their manufacture into textile fabrics.

2506. W. Richards, Birmingham—Imp. in fire-arms and cartridges.

2058. P. Ward, 2, Cloud's-hill-villas, St. George's, Bristol—Imp. in the manufacture of a double sulphide of calcium and sodium.

2510. A. Whytock, Lansdowne-terrace, Gloucester-road North, Regent's-park—Imp. in the construction of coated and uncoated sheet-iron boxes, and in the mode of, and apparatus for, straightening coated and uncoated sheet iron.

Dated 12*th September*, 1862.

2516. J. Rowell, Aberdeen, N.B.—Imp. in pillars and apparatus for straining wire.

2518. A. J. Moreau, Sherborne-street, Blandford-square—An improved mode of or process for reducing or melting pulverised metals or metallic ores.

Dated 13*th September*, 1862.

2522. H. J. Lewis, Birmingham—Imp. in engines to be worked by means of water.

2524. W. J. Williams, Arundel-street, Strand—Improved apparatus or machinery for punching, cutting, or pressing metal or other plates or substances, which said imps. are also applicable to tension rods.

2526. A. V. Newton, 66, Chancery lane—An improved mode of and apparatus for sleeking, creasing, and raising leather. (A com.)

2528. W. Palmer, Sutton-street, Clerkenwell—Imp. in lamps, and in apparatus used therewith.

Dated 15*th September*, 1862.

2530. W. G. Rawbone, Birmingham—Imp. in gun barrels, and in machinery to be employed in effecting the said imp., and in tools and machinery for producing inscriptions, ornaments, and devices upon gun barrels, lock plates, and other metallic parts of small arms, and for producing inscriptions upon saws and articles of cutlery generally.

Patents Sealed.

[*From Gazette, September* 26*th*, 1862.]

September 25*th*.

847. F. Tolhausen.
848. R. Edwards.
852. J. L. H. C. Comtesse de Vernede de Corneillan.
854. R. De Bary.
860. G. H. Birkbeck.
864. W. B. Nation.
865. R. A. Owen.
869. E. Smith.
872. J. Boucher.
873. Y. Parfrey.
883. E. B. Hart.
884. J. Platt and W. Richardson.
889. R. Young.
891. W. Tyler.
892. W. H. Hook.
894. W. B. Lord & F. H. Gilbart.
897. R. C. Ransome.
901. J. M. Clements.
906. P. R. Couchoud.
907. C. P. Gontard.
911. W. Turner.
917. E. Hartley, G. Little, and J. Hinchcliffe.
919. H. J. Madge.
920. J. Platt and W. Richardson.
924. Rev. G. Scratton.
925. S. Warren.
930. B. Blackburn.
931. S. Hunter.
932. T. Moore.
935. W. Leopard.
937. G. Rebour.
938. W. Helme.
939. R. Morton.
940. G. Bower and J. Qualter.
942. G. Hunter.
943. R. M. Toogood and J. Laybourne.
944. W. Kemp and T. Cowley.
946. D. Wilson.
948. A. Mann.
949. W. A. Richards.
951. J. F. Woodall.
955. F. C. Bakewell.
979. B. Thompson.
983. A. Harris.
1008. S. Farron.
1019. R. Theyson.
1029. L. Christoph, W. Hawksworth, & G. P. Harding.
1031. J. Platt, W. Richardson, and W. Holland.
1032. J. Petrie, jun.
1051. J. H. Johnson.
1061. J. Park.
1098. W. F. Lock.
1104. F. P. Warren.
1111. J. Ashbury.
1127, C. D. Abel.
1155. S. P. Matthews.
1208. G. Richards.
1218. A. C. Kirk.
1294. T. F. Griffiths.
1601. J. F. Harrison.
1612. P. Boisset & B. Antognini.
1668. J. J. H. Gebhardt.
1767. J. Lancelott.
1795. G. Haseltine.
2161. H. White.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, September* 30*th*, 1862.]

23*rd September*.

2202. C. Stevens.

25*th September*.

2188. P. J. Lejeune-Chaumont.

26*th September*.

2184. C. Cowper.
2221. J. H. Johnson.
2249. J. Rawlings.

27*th September*.

2204. T. Allan.
2235. E. Morewood.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, September* 30*th*, 1862.]

22*nd September*.

2129. J. Beattie.

25*th September*.

2168. J. Good.

26*th September*.

2175. J. Beattie.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4510	Sept. 19	Corrugated Metallic Bristle Holder	George Russum ... ... John Russum	46, Wade-lane, Leeds, Yorkshire.
4511	,, ,,	A New combined Neck clamp and Lever Gallery for carrying and adjusting the chimney glasses of lamps, and for regulating supply of air to the same	Henry Coulter	Liverpool.
4512	,, 24	A Match Holder	Samuel Needham	Oriel-place, College-street, Chelsea.